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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/760,606	01/16/2004	Oleg V. Kozyuk	24961-92	9948

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EXAMINER	
RAMDHANIE, BOBBY	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/760,606	KOZYUK, OLEG V.	
	Examiner	Art Unit	
	Bobby Ramdhanie, Ph.D.	1709	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01/16/2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *08/02/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 6, 12, 15, 17, & 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Ficklinger et al (US3849074). Regarding Claim 1, Ficklinger et al teaches a device for creating hydrodynamic cavitation in fluids comprising: A chamber formed by at least one wall (Figure 2), the wall having a first orifice configured to permit the introduction of a first liquid stream in to the chamber and an opposing second orifice configured to permit the introduction of a second liquid stream into the second orifice to permit penetration of the first liquid stream into the second liquid stream (Figure 2).

3. For Claim 6, Ficklinger et al teaches a device for creating hydrodynamic cavitation in fluids comprising: a housing having at least one wall defining an interior (Figure 2), the wall having a first orifice configured to permit the introduction of a first liquid stream into the interior and an opposing second orifice configured to permit the introduction of a second liquid stream into the interior, wherein the first orifice and second orifice generally share the same center-line and the first orifice has a diameter sufficiently smaller than the second orifice to permit penetration of the first liquid stream into the second liquid stream (Column 3 lines 18-23).

4. For Claim 12, Ficklinger et al teaches a device for creating hydrodynamic cavitation in fluids comprising: a flow through channel for passing a hydrodynamic liquid (Figure 2 Item number 34), the flow through channel having an outlet (Figure 2 Item number 32); a cavitation chamber situated within the flow-through channel (Figure 2 Item number 16), the cavitation chamber defined by at least one wall and an exit orifice wherein: the wall includes a first orifice configured and an opposing second orifice configured to permit the introduction of a first liquid stream into the chamber and an opposing second orifice configured to permit the introduction of a second liquid stream into the chambers (Figure 2); wherein the first and second orifices are generally aligned with each other and the first orifice has a diameter sufficiently smaller than the second orifice to permit penetration of the first liquid stream into the second liquid stream (Figure 2), and the exit orifice is in communication with the outlet (Figure 2 Item number 28); a restriction wall in physical communication with the wall and the flow-through channel to prevent the hydrodynamic liquid from exiting the flow-through channel before entering the first and second orifices (Figure 2 Item number 10).

5. For Claim 15, Ficklinger et al teaches a method of creating a hydrodynamic cavitation in a chamber defined by at least one wall, the method of comprising the steps of: introducing a first liquid stream through a first orifice in the wall to create a first liquid jet (Column 2 lines 63-65); introducing a second liquid stream through a second opposing orifice in the wall (Column 2 line 67 to Column 3 line 1) to create a second liquid jet that interacts with and penetrates the first liquid jet thereby creating a high shear intensity vortex contact layer resulting in hydrodynamic cavitation (Column 2 lines

58-60). Examiner takes the position that high-shear mixing defines a high shear vortex contact layer.

6. For Claim 17, Ficklinger et al teaches a method of creating hydrodynamic cavitation in fluids, the method comprising the steps of: passing a hydrodynamic liquid through a flow-through channel having at least one wall (Column 2 lines 63-66); introducing a first liquid stream through a first orifice in the wall to create a first liquid jet (Column 2 lines 63-66); introducing a second liquid stream through a second opposing orifice in the wall to create a second liquid jet (Column 2 line 67 to Column 3 line 1) that interacts with and penetrates the first liquid jet thereby creating a high shear intensity vortex contact layer (Column 2 lines 58-60); and creating a high shear vortex contact layer when the first liquid jet interacts with and penetrates the second liquid jet thereby creating hydrodynamic cavitation (Column 3 lines 16-23).

7. For Claim 18, Ficklinger et al teaches the method of Claim 17 and further teaches comprising the step of creating and collapsing cavitation caverns and bubbles in the high shear intensity vortex contact layer (Column 2 lines 46-50). Examiner takes the position that a high shear intensity vortex contact layer is equivalent to high shear mixing. When this occurs, both bubbles and collapsing caverns from the mixing occurs.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. Claims 1-5, 7-11, 13, 16, & 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kahl et al (US5723518). Regarding Claim 1, Kahl et al teaches a device for creating hydrodynamic cavitations in fluids comprising: A chamber formed by at least one wall (Figure 1), the wall having a first orifice configured to permit the introduction of a first liquid stream into the chamber and an opposing second orifice configured to permit the introduction of a second liquid stream into the chamber (Figure 1). Kahl et al does not teach the device of Claim 1, wherein the first orifice has a diameter sufficiently smaller than the second orifice to permit penetration of the first liquid stream into the second liquid stream. Kahl et al does teach that the emulsion holes of the first and second emulsifying attachment may be smaller or larger, and can act as nozzles (Column 2 lines 46-58 & Column 4 lines 26-31). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kahl et al to have the first orifice has a diameter sufficiently smaller than the second orifice to permit penetration of the first liquid stream into the second liquid stream

because this would be a cheap and inexpensive way of changing the flow rate of the two liquid components.

11. For Claim 2, Kahl et al teaches the device according to Claim 1. Kahl do not teach the device of claim 1 wherein the diameter of the first orifice is at least 10% smaller than the diameter of the second orifice. Kahl et al does teach that hole sizes range within 0.2 – 1 mm in size (Column 2 lines 48-52). It would have been obvious to one skilled in the art at the time the invention was made to modify Kahl et al to modify the device of claim 1 wherein the diameter of the first orifice is at least 10% smaller than the diameter of the second orifice because this would be a cheap and inexpensive way of changing the flow rate of the two liquid components.

12. For Claim 3, Kahl et al teaches the device of Claim 1. Kahl et al further teaches the device of Claim 1 comprising a second pair of orifices disposed in the wall such that the second pair of opposing orifices are in fluid communication with the chamber (Figure 2) and that the emulsion holes of the first and second emulsifying attachment may be smaller or larger, and can act as nozzles (Column 2 lines 46-58 & Column 4 lines 26-31). Kahl et al does not teach a device of Claim 1, wherein the first orifice has a diameter sufficiently smaller than the second orifice to permit penetration of the first liquid stream into the second liquid stream. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kahl et al to have the first orifice has a diameter sufficiently smaller than the second orifice to permit penetration of the first liquid stream into the second liquid stream because this would be a cheap and inexpensive way of changing the flow rate of the two liquid components.

13. For Claim 4, Kahl et al teaches the device of Claim 2. Kahl et al further teaches the device of Claim 2 wherein the second pair of opposing orifices shares the same centerline (Figure 2). Kahl et al does teach that hole sizes range within 0.2 – 1 mm in size (Column 2 lines 48-52). Kahl et al does not teach the device of Claim 1 wherein the diameter of the first orifice is at least 10% smaller than that diameter of the second orifice. It would have been obvious to one skilled in the art at the time the invention was made to modify Kahl et al to modify the device of claim 1 wherein the diameter of the first orifice is at least 10% smaller than the diameter of the second orifice because this would be a cheap and inexpensive way of changing the flow rate of the two liquid components.

14. For Claim 5, Kahl et al teaches the device of Claim 2. Kahl et al further teaches the device of Claim 2 wherein the opposing orifices have different sized diameters (Column 2 lines 48-52). Kahl et al does not teach the device of Claim 1 wherein the second pair of opposing orifices has different sized diameters. It would have been obvious to one skilled in the art at the time the invention was made to modify Kahl et al wherein the second pair of opposing orifices have different sized diameters because this would be a cheap and inexpensive way of changing the flow rate of the two liquid components.

15. For Claim 7, Kahl et al teaches a device for creating hydrodynamic cavitation in fluids comprising a flow through channel having at least one wall (Figure 1), the wall having a first orifice that is in communication with the flow through channel for introducing a first liquid stream into the flow through channel (Figure 1), the wall having

a second orifice opposite the first orifice that is in communication with the flow through channel for introducing a second liquid stream into the flow through channel (Figure 1), and wherein the first orifice and second orifice share the same centerline (Figure 1). Kahl et al does not teach that the first orifice has a diameter sufficiently smaller than the second orifice to permit penetration of the first liquid stream into the second liquid stream. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kahl et al to have the first orifice have a diameter sufficiently smaller than the second orifice to permit penetration of the first liquid stream into the second liquid stream because Kahl et al teaches alternatives to the size of the orifices (Column 2 lines 46-50) and that this would be a cheap and inexpensive way of changing the flow rate of the two liquid components.

16. For Claim 8, Kahl et al teaches the device of Claim 7, wherein the introduction of the first liquid stream through the first orifice creates a first liquid jet and introduction of the second liquid stream through the second orifice creates a second liquid jet (Column 2 lines 50-54). Kahl et al does not teach the device of Claim 1, wherein the first orifice has a diameter sufficiently smaller than the second orifice to permit penetration of the first liquid stream into the second liquid stream. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kahl et al to have the first orifice have a diameter sufficiently smaller than the second orifice to permit penetration of the first liquid stream into the second liquid stream because Kahl et al teaches alternatives to the size of the orifices (Column 2 lines 46-50) and that this would be a cheap and inexpensive way of changing the flow rate of the two liquid components.

17. Claims 9 & 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kahl et al (US5723518) in view of Ficklinger et al. Kahl et al teaches the device of Claim 8 wherein the first liquid jet impinges with the second liquid jet such that the first liquid jet penetrates and interacts with the second liquid jet thereby creating a high intensity shear layer (Figure 1). Kahl further teaches that the range of orifice sizes can be within 0.2-1.0 mm (Column 2 lines 46-50). Kahl et al does not teach that the first orifice has a diameter sufficiently smaller than the second orifice to permit penetration of the first liquid stream into the second liquid stream. It would have been obvious to one skilled in the art at the time the invention was made to modify Kahl et al to have the first orifice have a diameter sufficiently smaller than the second orifice to permit penetration of the first liquid stream into the second liquid stream because this would be a cheap and inexpensive way of changing the flow rate of the two liquid components.

18. For Claim 10, Kahl et al teaches the device of Claim 7 wherein the flow-through channel is configured for passing a hydrodynamic liquid through said flow-through channel (Figures 1 & 2). Kahl et al does not teach that the first orifice has a diameter sufficiently smaller than the second orifice to permit penetration of the first liquid stream into the second liquid stream. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kahl et al to have the first orifice have a diameter sufficiently smaller than the second orifice to permit penetration of the first liquid stream into the second liquid stream because because this would be a cheap and inexpensive way of changing the flow rate of the two liquid components.

19. For Claim 11, Kahl et al teaches the device of Claim 7. Kahl et al does not teach the device of Claim 7 wherein the diameter of the first orifice is at least 10% smaller than the diameter of the second orifice. It would have been obvious to one of ordinary skill at the time the invention was made to modify the device of Claim 7 wherein the diameter of the first orifice is at least 10% smaller than the diameter of the second orifice because Kahl further teaches that the range of the orifice sizes range within 0.2 to 1.0 mm (Column 2 lines 46-50) and because this would be a cheap and inexpensive way of changing the flow rate of the two liquid components.

20. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ficklinger et al in view of Kahl et al. Ficklinger et al teaches the device of Claim 12. Ficklinger et al does not teach the device of claim 12 further comprising a second cavitation chamber situated within the flow through channel in series with the first cavitation chamber, the second cavitation chamber having a pair of opposing orifices that are generally aligned with each other and have different diameters. Kahl et al teaches these features. Kahl et al teaches the device of claim 12 further comprising a second cavitation chamber situated within the flow through channel in series with the first cavitation chamber (Figure 2), the second cavitation chamber having a pair of opposing orifices that are generally aligned with each other and have different diameters (Figure 2). It would have been obvious to modify Ficklinger et al with Kahl et al because according to Kahl et al less energy is required to disperse water-borne two component coating systems using this two-chamber design (Column 4 lines 10-15). Examiner takes the position that Kahl et al does teach a range for the orifice sizes

(Column 2 lines 46-50). This would allow one of ordinary skill in the art to modify the orifice sizes to have different diameters.

21. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ficklinger et al. Regarding Claim 16, Ficklinger et al teaches the method of Claim 15. Ficklinger et al further teaches the method of Claim 15 wherein the relative velocity between the first and second liquid jets can be determined. Ficklinger et al does not teach that the relative velocity between the first and second liquid jets is at least 10 meters/second. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Ficklinger et al wherein the relative velocity between the first and second liquid jets is at least 10 meters/second because Ficklinger et al teaches that the size of the orifices are selected to provide a relative velocity of the two fluid streams to be equal mass velocity = (fluid density X linear velocity) (Column 3 lines 16-23).

22. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ficklinger et al. Regarding Claim 19, Ficklinger et al teaches the method of Claim 17. Ficklinger et al further teaches the method of Claim 17 wherein the relative velocity between the first and second liquid jets. Ficklinger et al does not teach that the relative velocity between the first and second liquid jets is at least 10 meters/second. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Ficklinger et al wherein the relative velocity between the first and second liquid jets is at least 10 meters/second because Ficklinger et al teaches that the size of

the orifices are selected to provide a relative velocity of the two fluid streams to be equal mass velocity = (fluid density X linear velocity) (Column 3 lines 16-23).

Claim Rejections - 35 USC § 112

23. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

24. Claim 14 recites the limitation "a second pair of orifices" in the first line of the claim. There is insufficient antecedent basis for this limitation in the claim.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bobby Ramdhanie, Ph.D. whose telephone number is 571-270-3240. The examiner can normally be reached on Mon-Fri 8-5 (Alt Fri off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter Griffin can be reached on 571-272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic

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BR

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